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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Francisco A. Uribe et al. Docket No.: S-94,613
Serial No.: 09/848, 823 Examiner: Crepeau
Filed : May 3, 2001 Art Unit: 1745
For : FUEL CELL ANODE CONFIGURATION FOR
CARBON MONOXIDE TOLERANCE

Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

DECLARATION UNDER 37 CFR 1.131

Sir:

I, **Francisco A. Uribe** of 280 Kilby Avenue, Los Alamos, NM, 87544, an employee of the University of California at Los Alamos National Laboratory, do hereby state:

THAT I and Thomas A. Zawodzinski are co-inventors of the invention disclosed in the above-identified patent application entitled "Fuel Cell Anode Configuration for Carbon Monoxide Tolerance";

THAT WE, as co-inventors, conceived and reduced to practice the above-identified invention prior to September 9, 2000, the publication date of Japanese Publication No. 2000-262899, as more particularly set out below.

1. I, in collaboration with Zawodzinski, conceived the subject invention on or before September 10, 1997, to improve the CO-tolerance of fuel cells having a reformat fuel stream including hydrogen, carbon dioxide (CO₂), carbon monoxide (CO), and oxygen by using non-precious metal catalysts on the fuel cell backing, such conception being recorded on page 119 of my laboratory notebook and dated 10 September 1997, Exhibit A hereto.

2. I, in collaboration with Zawodzinski, directed the construction of a fuel cell assembly for testing that included a polymer electrolyte membrane having an electrocatalytic surface formed from an electrocatalyst mixed with the polymer and bonded on a anode side of the membrane; and an anode backing formed of a porous electrically conductive material and having a first surface abutting the electrocatalytic

surface and a second surface facing away from the membrane, where the second surface was formed with an oxidation catalyst layer effective to catalyze the oxidation of CO by oxygen present in a fuel stream where the layer of oxidation catalyst was formed by using various non-precious metals selected from the group consisting of Cu, Fe, Co, Tb, W, Mo, Sn, and various oxides thereof.

3. I, in collaboration with Zawodzinski, directed a series of experiments to be performed on the fuel cell assembly from September 1997 through June 1998, where a series of inks were prepared from non-precious metal materials and applied to the second surface of the anode backing and tested in the fuel cell assembly to determine the suitability of selected non-metal catalysts for use in a fuel cell using a reformat fuel stream.

4. Table 1, Exhibit B hereto, summarizes the experimental results for the non-precious metal catalysts claimed by us and operability of the fuel cell assembly using those non-precious metal catalysts, with the table showing the non-precious metal in the ink applied to the second surface of the anode backing, along with reference to the cell identification number and notebook page that provides a detailed listing of the ink composition.

5. Exhibit C is comprised of my notebook pages that are summarized in Table 1 and shows preparation details for each of the ink compositions.

6. For fuel cell assemblies using each of the ink compositions shown in Exhibit C, output voltage vs. current data were obtained with 100 ppm CO in the reformat fuel and with various additions of air to the reformat fuel stream for comparison to a fuel stream of neat H₂. An exemplary computer-generated data set and attendant photomicrograph of the non-precious metal layer is attached as Exhibit D. In this instance, the experimental results are for the fuel cell identified as TF 345 (CuO) and similar data sets were generated for each of the fuel cell assemblies listed in Table 1.

7. Exhibit E is comprised of copies of pages from experimental station log books with fuel cell identification numbers that correspond to the fuel cell identification numbers shown in Table 1, Exhibit A and which accurately illustrate the various experimental conditions for each fuel cell and the respective dates for the experimental activity from October 1, 1997 through June 26, 1998.

8. Exhibit F is a copy of the invention disclosure, LAD 99-88, which was initially prepared by me and Zawodzinski on March 9, 1999, and officially signed and presented on September 24, 1999, for consideration at Los Alamos National Laboratory.

THAT all statements made herein of my own knowledge are true and all statements made on information and belief are believed to be true and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Francisco A. Uribe July 28, 2003
Francisco A. Uribe Date